



UNITED STATES PATENT AND TRADEMARK OFFICE

ek

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,385	04/12/2004	James C. Earthman	M-16437 US	3364
32605	7590	08/23/2006	EXAMINER	
MACPHERSON KWOK CHEN & HEID LLP 1762 TECHNOLOGY DRIVE, SUITE 226 SAN JOSE, CA 95110			NGUYEN, SANG H	
			ART UNIT	PAPER NUMBER
			2877	

DATE MAILED: 08/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/823,385

Applicant(s)

EARTHMAN ET AL.

Examiner

Sang Nguyen

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/28/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 10/28/04 has been entered. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

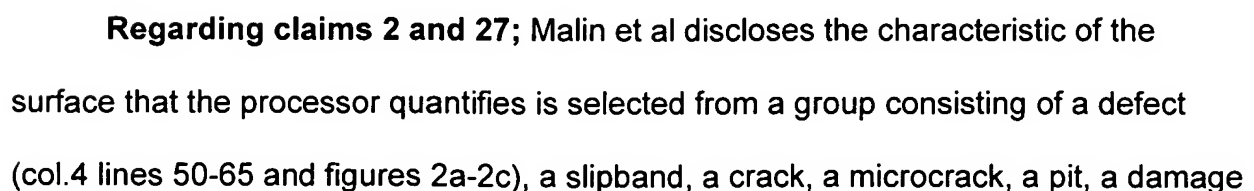
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4-6, 11, 13, 15, 18, 25-30, 32, 34, 36, 39 and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Malin et al (U.S. Patent No. 5,377,002).

Regarding claims 1, and 26; Malin et al discloses a method and system for quantifying an evolution of a characteristic of a surface of an object, the system comprising:

an energy source (2 of figure 1 and col.4 lines 8-12) for transmitting a source signal to a surface (10 of figure 1) of an object (11 of figure 1) for specular reflection or scattering (i.e., diffused light (14 of figure 1) with physical large defects (col.4 lines 51-54 and figures 2a-2c) [the claimed language of the present invention “specular reflection or scattering” is alternative. Thus, for examination purpose, the “specular reflection or scattering” is considered to be “scattering”];

a processor (i.e., the analyzer electronics [21 of figure 1]) for receiving the output signal of detector from the detector section (19, 20 of figure 1), the processor (21 of figure 1) for applying an algorithm (i.e., reference value [76B of figure 5a] and col.9 lines 30-40) to the detector signal to quantify an evolution in a characteristic of the surface (col.9 lines 8-40 and col.12 line 3 to col.12 line 68). See figures 1-10.



feature, corrosion, erosion, a contour change, an impact crater, and a change in residual stress.

Regarding claims 4-5 and 28-29; Malin et al discloses the energy source (2 of figure 1) transmits the source signal (1 of figures 2a-2c) over time such that the processor (22 of figure 1) quantifies temporal changes in the characteristic of the surface (10 of figure 2a-2c, for example, change to flat surface from roughness surface).

Regarding claims 6 and 30; Malin et al discloses the detector section (the photodetector [19 of figure 1]) receives a plurality of received signals (i.e., optical signals) and provides a corresponding plurality of detector signals (col.7 lines 50-58); the processor (21, 22 of figure 1) for applying the algorithm (i.e., reference values) to the plurality of detector signals (col.9 lines 29-40). See figures 6a-6b.

Regarding claims 11 and 32; Malin et al discloses the processor (21, 22 of figures 1 and 5a) includes a peak detector (74 of figure 5a) , the processor (21, 22 of figures 1 and 5a) providing a characteristic signal when a condition of the peak detector (74 of figure 5a) is met (col.9 lines 22-28).

Regarding claims 13 and 34; Malin et al discloses an subtractive function(73 of figure 5a) of the analyzer electronics (21 of figure 5a) for subtracting the detector signals to provide a difference (figures 5a-5b), wherein the peak detector (74 of figures 5a-5b) for providing the characteristic signal (i.e., a digital output [79 of figure 5a]) when the difference meets a threshold (i.e., an input signal [76b of figure 5a]).

Regarding claims 15 and 36; Malin et al discloses the peak detector (74 of figures 5a-5b) compares each of the detector signals (77, 75 of figures 5a-5b) to a

threshold (input signal [76b of figure 5a]) and provides a threshold detector signal (79b of figure 5a) when a respective one of the detector signals meets a threshold (col.9 lines 22-34).

Regarding claims 18 and 39; Malin et al discloses a computer (22 of figure 1) for receiving the characteristic signal from the processor (21 of figure 1) and for processing the characteristic signal (figures 1 and 8a-8b).

Regarding claims 25 and 43; Malin et al discloses the energy source includes a light source (2 of figure 1) for providing a source signal (1 of figure 1) that is focused lens (9 of figure e1) on or near the surface (10 of figure 1) and has a dimension of approximately the same magnitude as that of the characteristic of the surface to be quantified (col.4 lines 7-13).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Malin et al (U.S. Patent No. 5,377,002) in view of Moslehi (U.S. Patent No. 5,293,216).

Regarding claim 3; Malin et al discloses all of features of claimed invention except for the energy source and the detector section are installed *in situ* with respect to the object. However, Moslehi teaches that it is known in the art to provide the energy source (150 of figure 9) and the detector section (166 of figure 9) are installed *in situ*

with respect to the object (figures 1 and 9 and col.1 lines 13-18). It would have been obvious to one having ordinary skill in the art the time the invention was made to combine method and system of Malin et al with the energy source and the detector section are installed *in situ* with respect to the object as taught by Moslehi for the purpose of measuring accurately polycrystalline layer thickness, roughness surface, and electromagnetic emissivity on the semiconductor wafers.

Claims 7-10, 12, 14, 16-17, 22-24, 31, 33, 35, and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malin et al (U.S. Patent No. 5,377,002) in view of Meeks et al (U.S. Patent No. 6,392,749).

Regarding claims 7-10 and 31; Malin et al discloses all of features of claimed invention except for the processor determines which of the detector signals are relevant based on a parameter of the detected signals, wherein the parameters utilizes polarization, incident angle, and/or wavelength of the detector signals to determine relevancy. However, Meeks et al teaches that it is known in the art to provide device for measuring surface variation comprising the processor (240 of figure 2) determines which of the detector signals of a specular detector (224A of figure 2) and a scattered detector (224B of figure 2) are relevant based on a parameter of the detected signals (figures 5A-5C), wherein the parameters utilizes polarization (P or S polarized specular or scattered light in figures 5A-5C), incident angle (figure 5A), and/or wavelength (col.6 lines 50-67) of the detector signals to determine relevancy. It would have been obvious to one having ordinary skill in the art the time the invention was made to combine method and system of Malin et al with the processor determines which of the detector

signals are relevant based on a parameter of the detected signals, wherein the parameters utilizes polarization, incident angle, and/or wavelength of the detector signals to determine relevancy as taught by Meeks et al for the purpose of measuring accurately a variety of properties of surface thin film.

Regarding claims 12 and 33; Malin et al discloses all of features of claimed invention except for an additive function for adding the detector signals to provide a sum; the peak detector providing the characteristic signal when the sum meets a threshold. It would have been obvious to one having ordinary skill in the art the time the invention was made to combine method and system of Malin et al with an additive function for adding the detector signals to provide a sum; the peak detector providing the characteristic signal when the sum meets a threshold, since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. In re Einstein, 8 USPQ 167.

Regarding claims 14 and 35; Malin et al discloses all of features of claimed invention except for a multiplicative function for multiplying the detector signals to provide a product; the peak detector providing the characteristic signal when the product meets a threshold. It would have been obvious to one having ordinary skill in the art the time the invention was made to combine method and system of Malin et al with a multiplicative function for multiplying the detector signals to provide a product; the peak detector providing the characteristic signal when the product meets a threshold, since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. In re Einstein, 8 USPQ 167.

Regarding claims 16 and 37; Malin et al discloses all of features of claimed invention except for applies an AND function to the threshold detector signals and provides the characteristic signal as a result of the AND function. It would have been obvious to one having ordinary skill in the art the time the invention was made to combine method and system of Malin et al with an AND function to the threshold detector signals and provides the characteristic signal as a result of the AND function (see prior art [U.S. Patent No. 6,441,385] in figures 22-23), since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. In re Einstein, 8 USPQ 167.

Regarding claims 17 and 38; Malin et al discloses all of features of claimed invention except for applies a summation function to the threshold detector signals and provides the characteristic signal when the result of the summation function meets a threshold. It would have been obvious to one having ordinary skill in the art the time the invention was made to combine method and system of Malin et al with a summation function to the threshold detector signals and provides the characteristic signal when the result of the summation function meets a threshold (see prior art [U.S. Patent No. 6,441,385] in figures 22-23), since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. In re Einstein, 8 USPQ 167.

Regarding claims 22-23; Malin et al discloses all of features of claimed invention except for the detector section includes a plurality of detectors disposed spatially about the energy source and/or above the surface of the object. However,

Meeks et al teaches that it is known in the art to provide the detector section includes a plurality of detectors (224A, 224B, 212 of figure 20) disposed spatially about the energy source and/or above the surface of the object (100 of figure 20). It would have been obvious to one having ordinary skill in the art the time the invention was made to combine method and system of Malin et al with the detector section includes a plurality of detectors disposed spatially about the energy source and/or above the surface of the object as taught by Meeks et al for the purpose of measuring accurately a variety of properties of surface thin film.

Regarding claim 24; Malin et al discloses all of features of claimed invention except for the detector section includes an annular detector disposed about the energy source. However, Meeks et al teaches that it is known in the art to provide the detector section includes an annular detector (figure 37) disposed about the energy source. It would have been obvious to one having ordinary skill in the art the time the invention was made to combine method and system of Malin et al with the detector section includes an annular detector disposed about the energy source as taught by Meeks et al for the purpose of measuring accurately a variety of properties of surface thin film.

Claims 19-21 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malin et al (U.S. Patent No. 5,377,002) in view of BackGround of Present Invention (Paragraph [0006] to [0009]).

Regarding claims 29-21 and 40-42; Malin et al discloses all of features of claimed invention except for the computer processes the characteristic signal in performing a failure precursor, and/or a damage prognosis and/or a remaining-life

prognosis. However, Background of Present Invention teaches that it is known in the art to provide the computer processes the characteristic signal in performing a failure precursor, and/or a damage prognosis and/or a remaining-life prognosis (see paragraph [0006] to [0009]). It would have been obvious to one having ordinary skill in the art the time the invention was made to combine method and system of Malin et al with the computer processes the characteristic signal in performing a failure precursor, and/or a damage prognosis and/or a remaining-life prognosis as taught by Background of Present Invention for the purpose of measuring and classifying defects on the substrate with high speed and more accuracy.

Conclusion


The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Vaez-Iravani et al (6862096) discloses defect detection system; Jann et al (5978091) discloses laser bump sensor method and apparatus; Svetkoff et al (5812269) discloses triangulation based 3D imaging and processing method and system; Birang (5708506) discloses apparatus and method detection surface roughness in a chemical polishing pad condition process; Ellingson et al (5426506) discloses optical method and apparatus for detecting surface; Corby, Jr. (4664514) discloses method of enhancing surface features ; or Turner (3986160) discloses visualization by ultrasonic.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sang Nguyen whose telephone number is (571) 272-2425. The examiner can normally be reached on 9:30 am to 7:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

August 18, 2006


Sang Nguyen
Patent Examiner
Art Unit 2877